Versar INC.

95 SEP 13 **REVIEW DRAFT-NOT FOR RELEASE**

September 8, 1995

Mr. Barney Chan
Alameda County Health Care Services Agency
Department of Environmental Health
Hazardous Materials Division
1131 Harbor Bay Parkway
Alameda, California 94502

Reference: Addendum to Site Investigation Workplan for the Former Pacific Dry Dock and Repair Yard II Facility Located at 320 Embarcadero in Oakland, California; Versar Project No. 2463-102

Dear Mr. Chan:

The purpose of this letter is to serve as an addendum to the Site Investigation Workplan, dated June 13, 1991, for the former Pacific Dry Dock and Repair Yard II facility, located at 320 Embarcadero in Oakland, California (the Site). The following addendum describes the installation of groundwater monitoring wells and other related activities proposed for the Site.

WORKPLAN BACKGROUND

On June 13, 1991, a workplan was submitted which proposed a magnetic and magnetometer geophysical survey of the Site; the drilling of approximately 19 boreholes for the collection and subsequent analysis of soil samples; and the drilling and installation of six groundwater monitoring wells for the collection and subsequent analysis of groundwater samples. A brief summary of the activities that have occurred since submittal of this workplan is present and below.

A subsurface investigation was conducted in May 1994 to delineate the extent of impacted soil at the Site. The investigation included the collection of 93 soil samples and one groundwater sample from 21 boreholes. Of these soil samples, selective samples were analyzed for various analytes based on Site location and field screening results. The analytical results are summarized in Figure 1. In summary, the analytical results reported the presence of oil and grease at various concentrations across the majority of the Site. Total petroleum hydrocarbons as gasoline and diesel were reported in a number of the samples, particularly in the northern portion of the Site. Aromatic and chlorinated hydrocarbons were reported in samples collected in the northeast and northern portions of the Site. Heavy metals were reported in a number of the samples.

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The highest concentrations were present on the western property boundary were lead and copper were reported at concentration of 110 and 660 milligrams per kilogram (mg/kg), respectively.

The grab water samples was collected from borehole BH18, located in the northern portion of the Site. Free product was observed on the water table at this location. Laboratory analysis of the free product reported biodegraded petroleum hydrocarbons.

In July, 1994, Versar supervised the drilling and installation of three, four-inch groundwater monitoring wells at the Site. Following installation, each well was developed and sampled according to EPA protocols. The samples were analyzed for volatile organic compounds (VOCs) by EPA Method 8240; total petroleum hydrocarbons as diesel (TPH-D) by EPA Method 8015M; total petroleum hydrocarbons as gasoline (TPH-G) by the Department of Health Services (DHS) Method; and benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8020. The laboratory analytical results indicated that the groundwater samples collected from monitoring wells MW1 and MW3 did not contain TPH-G or BTEX. The groundwater sample from MW2 contained 1,600 micrograms per liter (µg/L) of TPH-G, 77 µg/L of benzene, and 850 µg/L of total xylenes. The groundwater samples from MW1 and MW2 contained 220 and 2,500 µg/L of TPH-D, respectively; and the samples from MW1, MW2, and MW3 contained chlorobenzene concentrations of 4.6 µg/L, 790 µg/L, and 0.51 µg/L, respectively. Quarterly groundwater monitoring and sampling of these wells commenced in May 1995.

In September 1994, Versar supervised the removal of a 500-gallon underground storage tank (UST). Soil samples collected from the excavation following removal of the UST were analyzed for TPH-G; BTEX; and total lead. The laboratory analyses did not report any concentrations of TPH-G or BTEX in the samples collected from the stockpiled excavated soils or the UST excavation. Site closure regarding the former UST was received from Alameda County Health Care Services Agency in a letter dated March 2, 1995.

Based on the results of the May 1994 subsurface investigation, an additional phase of site investigation was conducted in April 1995 to define the lateral extent of soil contamination within the vadose zone. Based upon previous activities and environmental concerns at the Site, the Site was divided into areas of concern. These areas are shown in Figure 2. Four of these areas were investigated during the April

1995 investigation. The analytical results are shown by location in Figures 2 (Areas 1, 2, and 6) and 3 (Area 5).

Area No. 1 identified petroleum hydrocarbons (TPH-D, TPH-G, and BTEX), mercury, copper, and lead. One mercury concentration identified exceeded the total threshold limit concentration (TTLC). Concentrations of lead and copper identified were below the TTLC, but greater than ten times the soluble threshold limit concentration (STLC). Versar collected samples of the vadose soils at two locations in Area 1 and analyzed them for TPH-D, TPH-G, BTEX, total lead, and total copper. One sample was additionally analyzed for soluble lead by the waste extraction test (WET). Within Area 1, TPH-D concentrations ranged between non-detect and 59 mg/kg. No TPH-G or BTEX was reported. Total lead and total copper concentrations ranged between 13 and 92 mg/kg and 22 and 98 mg/kg, respectively. The soluble lead concentration, by WET, for the sample which reported 92 mg/kg of lead, was 2.4 milligrams per liter.

Three locations were cored in Area No. 2 to determine if the previously identified lead contamination was aerially extensive. Two soil samples from each location were collected at depths of 2.5 feet bgs and 6.0 feet bgs, and analyzed for total lead and organic lead. The samples concentrations of total lead ranged between 4.5 and 38 mg/kg. Organic lead was not identified above the method reporting limit in any of the samples.

Soil coring was conducted at 18 locations in Area No. 5 to define potential source areas for petroleum hydrocarbon and halogenated volatile organic compounds (VOC) contamination. Data collected during the field investigation identified an area of light non-aqueous phase liquid (LNAPL) in the smear zone located approximately five feet bgs. A total of 21 soil samples were collected and analyzed for TPH-D, TPH-G, BTEX, and halogenated VOCs. Petroleum hydrocarbons were identified in soil samples collected from the vadose zone at 15 of the 18 locations. Halogenated VOCs were identified in soil samples collected from 10 of the 18 locations.

In Area No. 6, Versar collected soil samples from corings in five locations to determine if a source area existed for petroleum hydrocarbons identified in monitoring well MW1. A soil samples from each coring location was collected and submitted for laboratory analysis for TPH-D, TPH-G, and BTEX. The results of laboratory analyses did not identify concentrations of TPH-G, benzene, or toluene above the method reporting limits in any of the samples collected from Area 6. Laboratory analysis

identified 5.3 mg/kg of TPH-D, 0.0052 mg/kg of ethylbenzene, and 0.043 mg/kg of xylenes in a soil sample collected at 2.5 feet bgs in coring CH6. At 2.0 feet bgs in coring CH9, laboratory analysis identified 7.0 mg/kg of TPH-D and 0.038 mg/kg of xylenes.

Based upon the results of the initial groundwater sampling of the three groundwater monitoring wells, and subsequent groundwater monitoring and sampling, 11 temporary sampling points (TSP) were installed to evaluate groundwater quality at the Site in June 1995. Laboratory analysis of groundwater from the TSPs, indicated the presence of TPH-D and TPH-G in four TSPs along the northern property boundary with Embarcadero Avenue. Halogenated VOCs were also reported in the same four TSPs. Low levels of TPH-D were reported in a number of the other TSPs across the Site. A graphical summary of the analytical results from the TSP sampling and the most recent groundwater sampling event (June 1995) is presented in Figure 4.

Scope of Work for Workplan Addendum

The following scope of work will be conducted under the general condition of Versar's original workplan dated June 13, 1991. The proposed work is based on the findings of the work conducted to date. Presented below is the scope for modification and changes to the original scope of work.

(i) Monitoring Well Installation

To assist in the evaluation of groundwater quality beneath the Site, the following work is proposed to install four additional groundwater monitoring wells at the Site. These wells include the three outstanding monitoring wells originally proposed, plus an additional groundwater monitoring well. All wells will be constructed in a manner as proposed in the June 13, 1991 workplan. This will consist of the installation of 4-inch diameter PVC walls to a depth of approximately 15 feet below ground surface (bgs), with 12 feet of screen. The proposed location of these wells is shown in Figure 5. The location of these wells is based upon recent groundwater sampling results, and with the purpose of delineating the extent of groundwater impairment and evaluating the potential of contaminant migration on to or off of the Site.

(ii) Soil Sampling

To further evaluate and delineate the extent of the identified soil impairment, soil samples will be collected for potential laboratory analyses as drilling progresses of the monitoring well borings. Sampling will be conducted at three feet intervals throughout each boring, to allow a full understanding of subsurface geological and environmental conditions. Based on field screening, two samples will be selected from each well boring for laboratory analysis. Based on historical information and the nature of the contaminants previously identified, this will include a sample from the vadose and saturated zone in each boring. All samples will be analyzed for TPH-G, TPH-D, VOC by EPA Method 8240 and total oil and grease by Method 5520E,F. All laboratory soil analyses will be conducted by a state certified laboratory. \ oxygenates ?

(iii) Groundwater Sampling

Upon of the installation of the four groundwater monitoring wells, each well will be measured, developed, purged, and sampled in accordance with standard procedures. Groundwater samples will be collected from each well and analyzed for TPH-G, TPH-D, and VOCs by EPA Method 601/602 or 624. Following the initial sampling, groundwater sampling for these newly installed wells will be incorporated into the existing groundwater monitoring and sampling program for the Site. - Too ?

(iv) Monitoring Well Elevation and Location Survey

Following installation of the wells, each newly installed well will be surveyed to a common datapoint and tied into the three existing wells on Site. Data obtained during the survey will be used to calculate groundwater movement beneath the Site, and used in possible tidal studies.

(v) Schedule

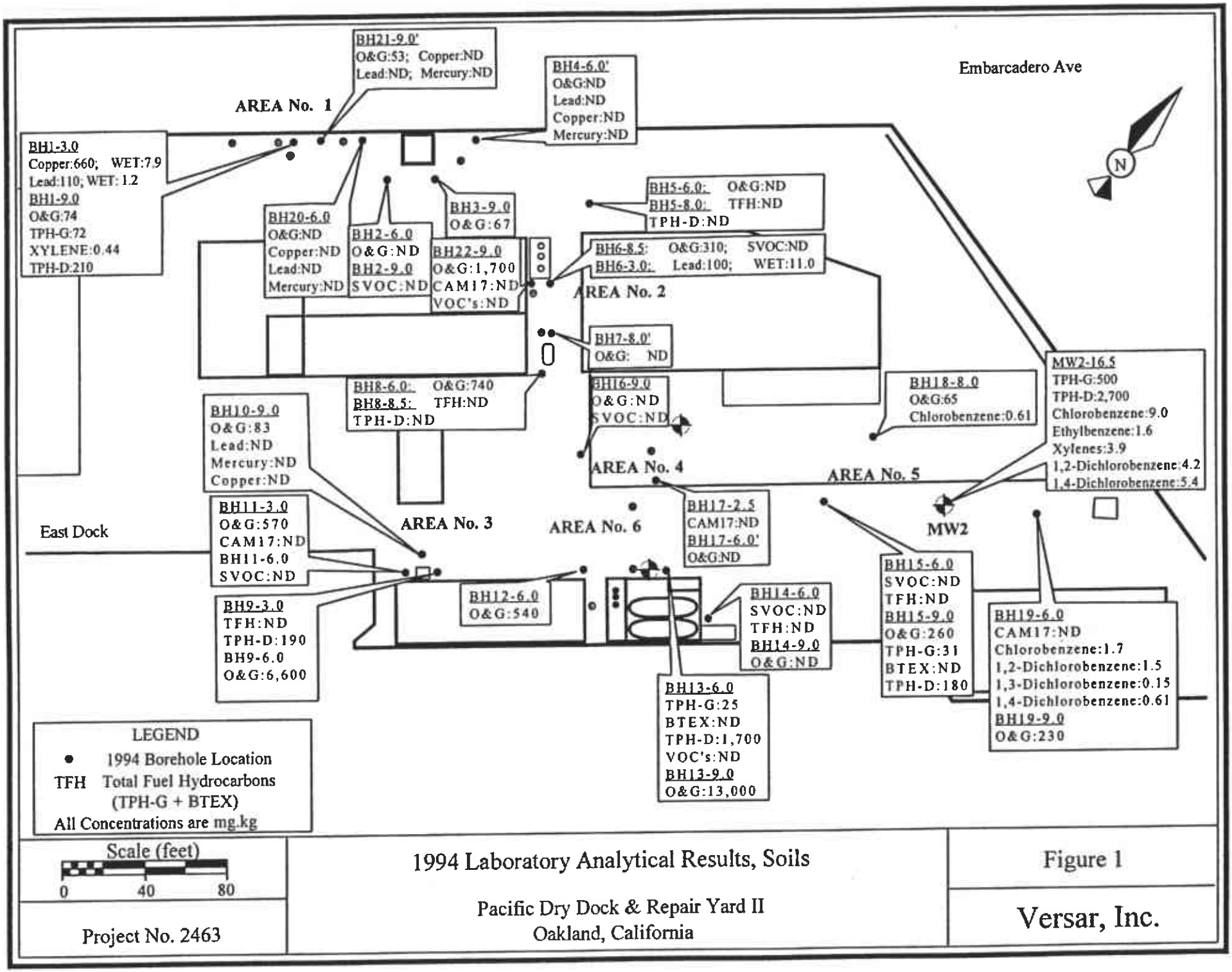
Field activities will be implemented upon receipt of your concurrence to this addendum to the original workplan. A proposed schedule is presented below.

Installation of Groundwater Monitoring Well	18 September 1995
Initial Sampling of Monitoring Well	25 September 1995
Receipt of all Analytical Results	17 October 1995
Submittal of PIER	(*TBA*)
Groundwater Sampling Event, 3rd Quarter 1995	September 1995

This workplan addendum has been prepared by Versar, Inc. on behalf of Crowley Marine Services, Inc. If you have any questions or comments regarding the contents of this addendum or require additional information, please contact Mr. Stephen Wilson of Crowley Marine Services, Inc. at (206) 443-7882.

(Final to be Signed)
Michael P. Sellens R.G.
Manager, Geoscience Department

(Final to be Signed)
Michael D. Holley P.E.
Engineering Department Head



1994 Laboratory Analytical Results, Soils

Pacific Dry Dock & Repair Yard II
Oakland, California

Figure 1

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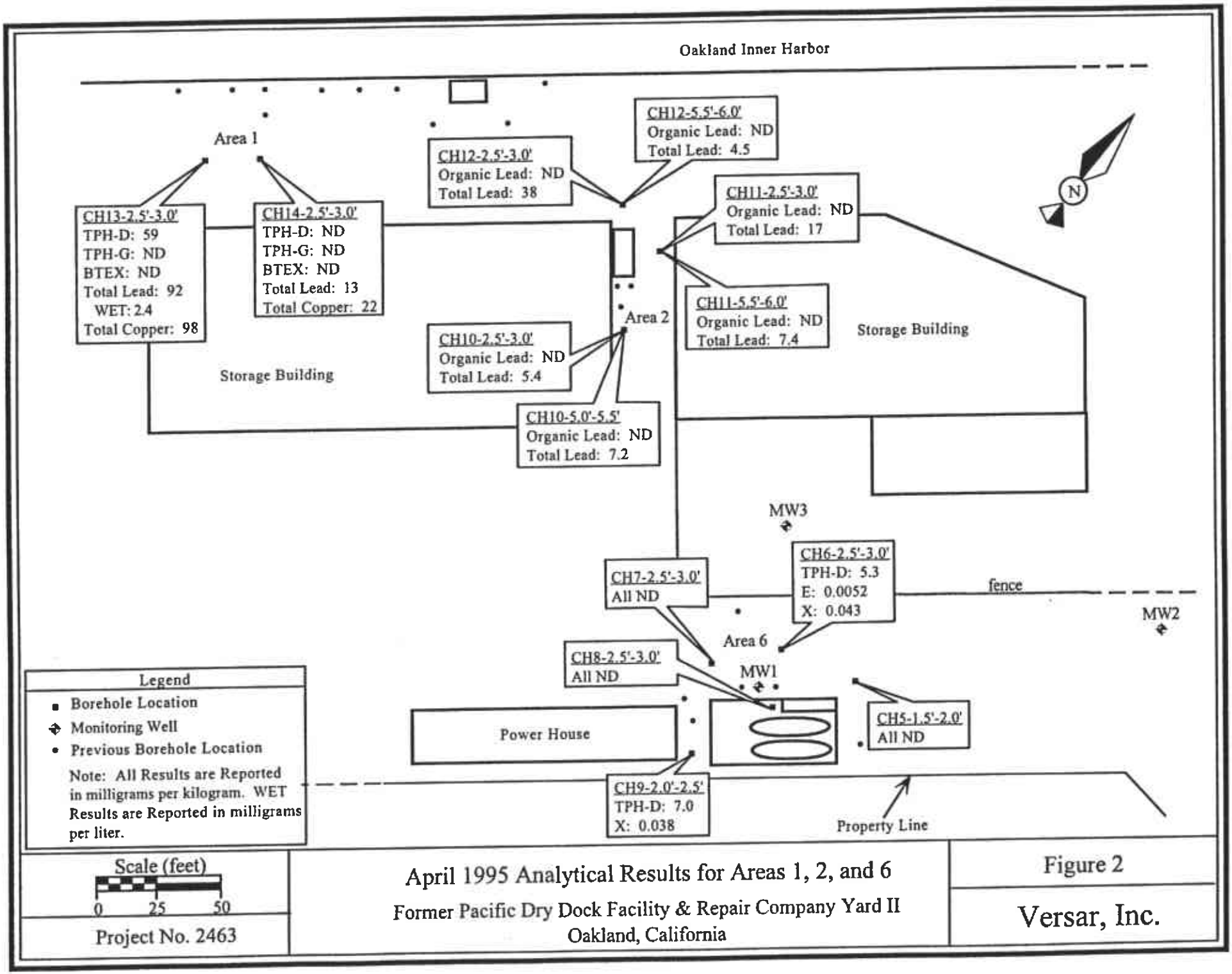
Oakland Inner Harbor
Area 1
CH13-2.5'-3.0'
TPH-D: 59
TPH-G: ND
BTEX: ND
Total Lead: 92
WET: 2.4
Total Copper: 98
CH14-2.5'-3.0'
TPH-D: ND
TPH-G: ND
BTEX: ND
Total Lead: 13
Total Copper: 22
CH12-2.5'-3.0'
Organic Lead: ND
Total Lead: 38
CH12-5.5'-6.0'
Organic Lead: ND
Total Lead: 4.5
CH11-2.5'-3.0'
Organic Lead: ND
Total Lead: 17
CH11-5.5'-6.0'
Organic Lead: ND
Total Lead: 7.4
Area 2
Storage Building
CH10-2.5'-3.0'
Organic Lead: ND
Total Lead: 5.4
CH10-5.0'-5.5'
Organic Lead: ND
Total Lead: 7.2
Storage Building
N
MW3
CH6-2.5'-3.0'
TPH-D: 5.3
E: 0.0052
X: 0.043
fence
MW2
CH7-2.5'-3.0'
All ND
Area 6
CH8-2.5'-3.0'
All ND
MW1
Power House
CH5-1.5'-2.0'
All ND
CH9-2.0'-2.5'
TPH-D: 7.0
X: 0.038
Property Line
Legend
Borehole Location
Monitoring Well
Previous Borehole Location
Note: All Results are Reported in milligrams per kilogram. WET Results are Reported in milligrams per liter.
Scale (feet)
0 25 50
Project No. 2463
April 1995 Analytical Results for Areas 1, 2, and 6
Former Pacific Dry Dock Facility & Repair Company Yard II
Oakland, California
Figure 2
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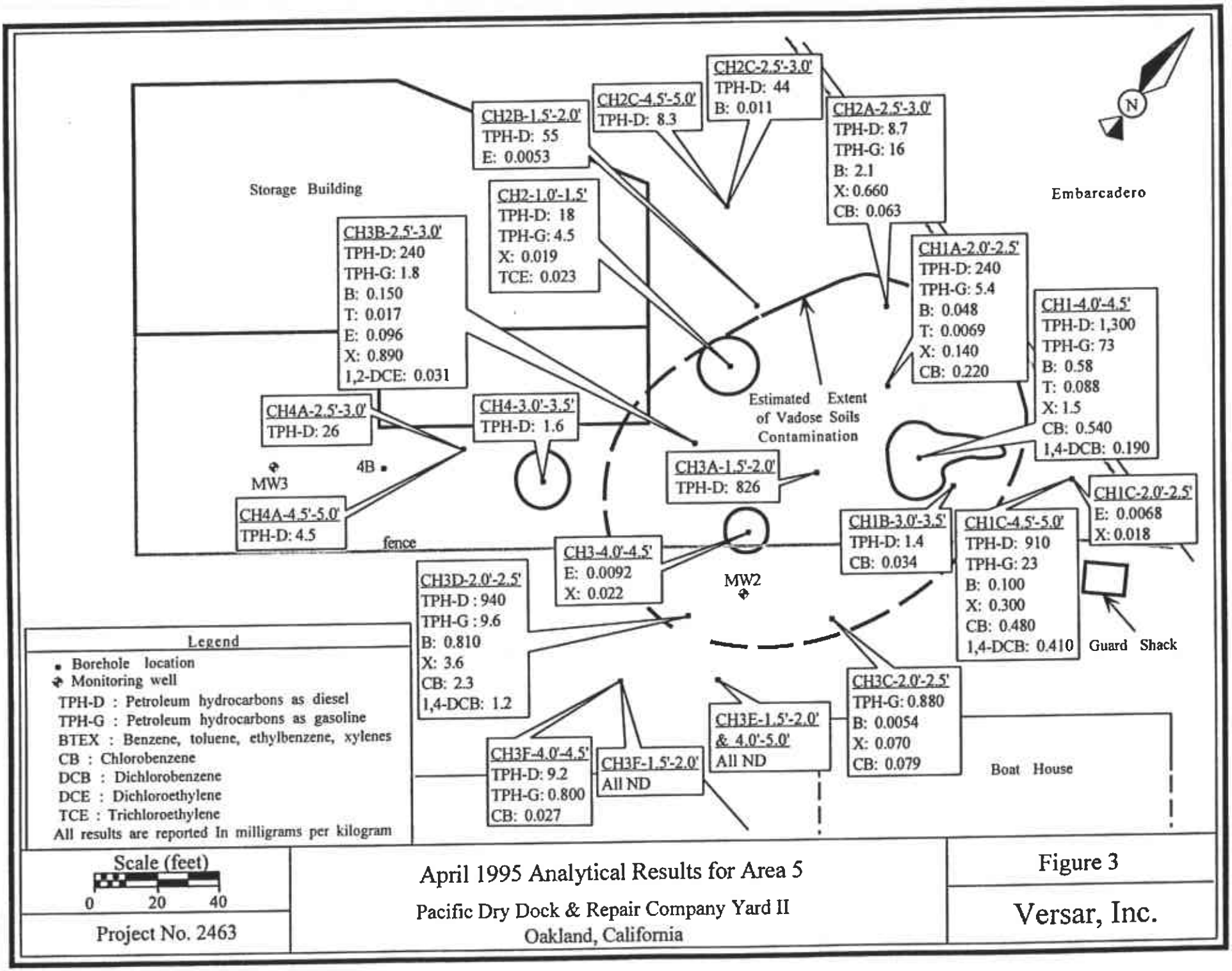
CH2C-2.5'-3.0'
TPH-D: 44
B: 0.011
CH2C-4.5'-5.0'
TPH-D: 8.3
CH2B-1.5'-2.0'
TPH-D: 55
E: 0.0053
CH2A-2.5'-3.0'
TPH-D: 8.7
TPH-G: 16
B: 2.1
X: 0.660
CB: 0.063
N
Storage Building
Embarcadero
CH2-1.0'-1.5'
TPH-D: 18
TPH-G: 4.5
X: 0.019
TCE: 0.023
CH3B-2.5'-3.0'
TPH-D: 240
TPH-G: 1.8
B: 0.150
T: 0.017
E: 0.096
X: 0.890
1,2-DCE: 0.031
CH1A-2.0'-2.5'
TPH-D: 240
TPH-G: 5.4
B: 0.048
T: 0.0069
X: 0.140
CB: 0.220
CH1-4.0'-4.5'
TPH-D: 1,300
TPH-G: 73
B: 0.58
T: 0.088
X: 1.5
CB: 0.540
1,4-DCB: 0.190
Estimated Extent of Vadose Soils Contamination
CH4A-2.5'-3.0'
TPH-D: 26
CH4-3.0'-3.5'
TPH-D: 1.6
MW3
4B
CH3A-1.5'-2.0'
TPH-D: 826
CH1C-2.0'-2.5'
E: 0.0068
X: 0.018
CH4A-4.5'-5.0'
TPH-D: 4.5
fence
CH1B-3.0'-3.5'
TPH-D: 1.4
CB: 0.034
CH1C-4.5'-5.0'
TPH-D: 910
TPH-G: 23
B: 0.100
X: 0.300
CB: 0.480
1,4-DCB: 0.410
CH3-4.0'-4.5'
E: 0.0092
X: 0.022
MW2
CH3D-2.0'-2.5'
TPH-D : 940
TPH-G : 9.6
B: 0.810
X: 3.6
CB: 2.3
1,4-DCB: 1.2
Guard Shack
CH3C-2.0'-2.5'
TPH-G: 0.880
B: 0.0054
X: 0.070
CB: 0.079
CH3E-1.5'-2.0'
& 4.0'-5.0'
All ND
CH3F-4.0'-4.5'
TPH-D: 9.2
TPH-G: 0.800
CB: 0.027
CH3F-1.5'-2.0'
All ND
Boat House
Legend
• Borehole location
Monitoring well
TPH-D : Petroleum hydrocarbons as diesel
TPH-G : Petroleum hydrocarbons as gasoline
BTEX : Benzene, toluene, ethylbenzene, xylenes
CB : Chlorobenzene
DCB : Dichlorobenzene
DCE : Dichloroethylene
TCE : Trichloroethylene
All results are reported In milligrams per kilogram
Scale (feet)
0 20 40
Project No. 2463
April 1995 Analytical Results for Area 5
Pacific Dry Dock & Repair Company Yard II
Oakland, California
Figure 3
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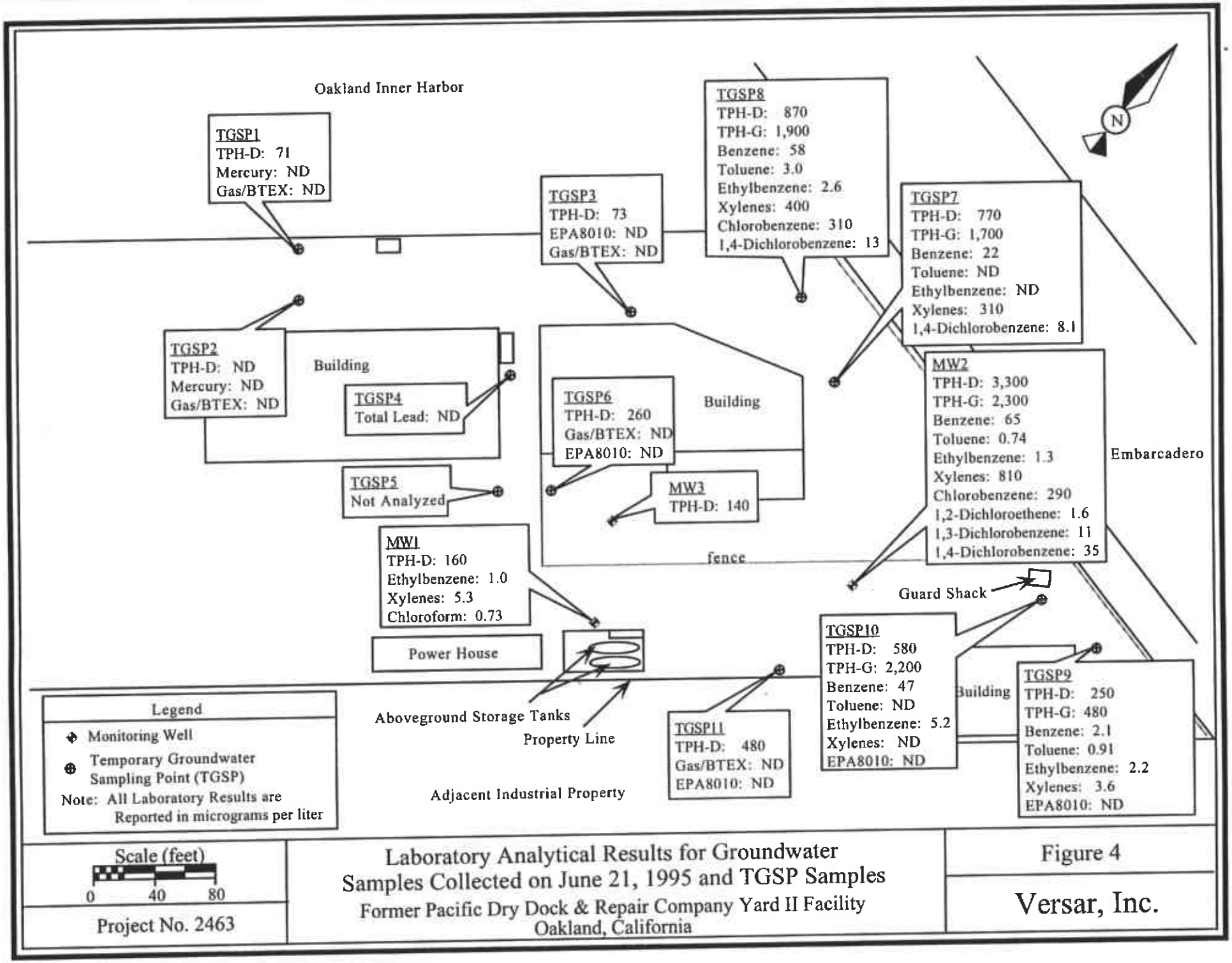
Oakland Inner Harbor
TGSP1
TPH-D: 71
Mercury: ND
Gas/BTEX: ND
TGSP3
TPH-D: 73
EPA8010: ND
Gas/BTEX: ND
TGSP8
TPH-D: 870
TPH-G: 1,900
Benzene: 58
Toluene: 3.0
Ethylbenzene: 2.6
Xylenes: 400
Chlorobenzene: 310
1,4-Dichlorobenzene: 13
TGSP7
TPH-D: 770
TPH-G: 1,700
Benzene: 22
Toluene: ND
Ethylbenzene: ND
Xylenes: 310
1,4-Dichlorobenzene: 8.1
N
TGSP2
TPH-D: ND
Mercury: ND
Gas/BTEX: ND
Building
TGSP4
Total Lead: ND
TGSP6
TPH-D: 260
Gas/BTEX: ND
EPA8010: ND
Building
MW2
TPH-D: 3,300
TPH-G: 2,300
Benzene: 65
Toluene: 0.74
Ethylbenzene: 1.3
Xylenes: 810
Chlorobenzene: 290
1,2-Dichloroethene: 1.6
1,3-Dichlorobenzene: 11
1,4-Dichlorobenzene: 35
Embarcadero
TGSP5
Not Analyzed
MW3
TPH-D: 140
MW1
TPH-D: 160
Ethylbenzene: 1.0
Xylenes: 5.3
Chloroform: 0.73
fence
Guard Shack
Power House
TGSP10
TPH-D: 580
TPH-G: 2,200
Benzene: 47
Toluene: ND
Ethylbenzene: 5.2
Xylenes: ND
EPA8010: ND
Building
TGSP9
TPH-D: 250
TPH-G: 480
Benzene: 2.1
Toluene: 0.91
Ethylbenzene: 2.2
Xylenes: 3.6
EPA8010: ND
Aboveground Storage Tanks
Property Line
TGSP11
TPH-D: 480
Gas/BTEX: ND
EPA8010: ND
Adjacent Industrial Property
Legend
Monitoring Well
Temporary Groundwater Sampling Point (TGSP)
Note: All Laboratory Results are Reported in micrograms per liter
Scale (feet)
0
40
80
Project No. 2463
Laboratory Analytical Results for Groundwater Samples Collected on June 21, 1995 and TGSP Samples
Former Pacific Dry Dock & Repair Company Yard II Facility
Oakland, California
Figure 4
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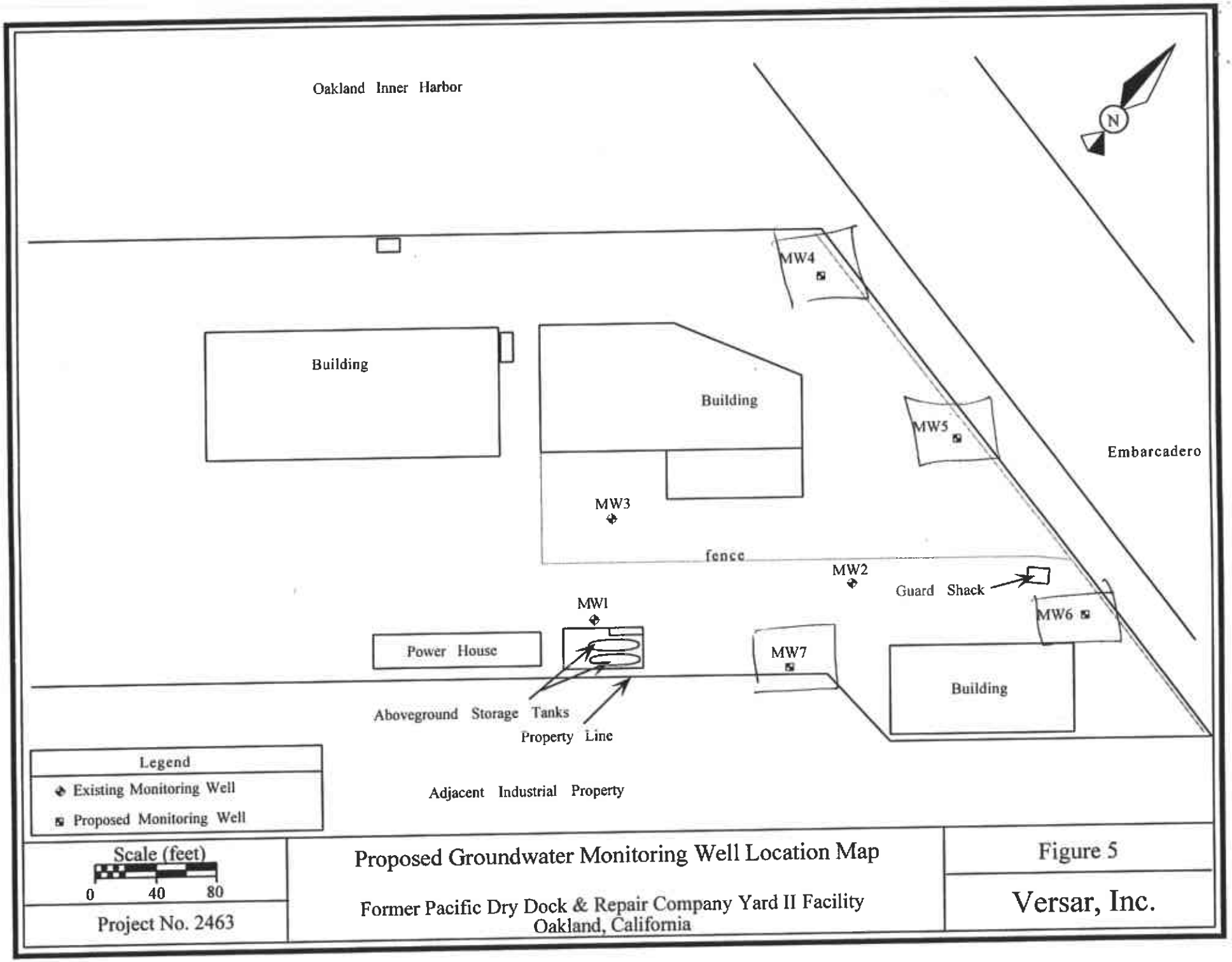

Proposed Groundwater Monitoring Well Location Map

Former Pacific Dry Dock & Repair Company Yard II Facility
Oakland, California

Figure 5

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